

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133**REMARKS**

Claims 1-22 are pending in the present application.

No claims are amended in this Reply to Office Action.

Applicant respectfully requests reconsideration of the application based on the following points. Applicant respectfully submits that the presently pending claims would not have been obvious over the prior art generally and would not have been obvious over the particular prior art cited in the Office Action, and accordingly are in condition for allowance.

Applicant respectfully traverses the rejections set forth in the Office Action for at least the following reasons.

Applicant respectfully notes that in determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a *whole* would have been obvious. As set forth in MPEP 2141.02:

In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983).

Applicant respectfully submits that in the present Office Action, the Examiner asserted a case of obviousness of the claimed invention as a whole based on the alleged obviousness of the differences taken individually, and that the rejections of the claims as wholes therefore cannot stand and should be withdrawn.

Obviousness can not be established by merely combining or modifying the teachings of the prior art. Instead, there must be some teaching, suggestion or motivation for one of ordinary skill in the art to perform the modifications in a way that would have led to the presently claimed invention.

Applicant respectfully submits that the rejections set forth in the present Office Action amount to little more than a collection of various elements combined with an assertion that it would have been obvious to modify and combine these elements to attain

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133

the presently claimed invention. Such a rejection fails to comport with the law. As set forth in MPEP 706.02(j):

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

Applicant respectfully submits that the Examiner failed to carry the initial burden set forth in MPEP 706.02(j). As will be shown below, the prior art does not provide such a teaching, suggestion or motivation to perform the various modifications required for achieving the claimed invention.

Furthermore, the statements of the rejections in the Office Action fail to show how the references teach each of the claimed elements, combined as claimed. Instead the statements of the rejections merely show, at best, that the prior art was attempting to do something similar to that which Applicant discloses and claims. The Office Action fails to do more than enumerate a variety of similarities based on a plurality of modifications which would be necessary in order to reach the claimed invention. The rejections set forth in the Office Action can only be the result of improperly applied hindsight-based reconstruction of Applicant's claimed invention resulting from picking and choosing various elements from the prior art but with no showing of a teaching, suggestion or any other motivation to make the asserted combination.

Applicant respectfully submits that the sheer number of references required to be combined to support the alleged obviousness of Applicant's claimed invention further shows that the rejection is without proper basis in fact or law. The Examiner was required to combine six references to support, and almost three full pages to set forth, the rejection of claim 1, and an additional page to set forth the rejections of claims 2, 3 and 11-13. The Examiner was required to combine eight references in two different groups of seven each to support the rejections of claims 4-7, 9, 10, 14-17 and 19-22. The Examiner was required to combine eight references to support the rejections of claims 8 and 18. The sheer number of references required to be applied to support the rejections shows that no

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133

person of ordinary skill in the art would make such a selection and modification of elements claimed, based on the teachings of the references cited. There are simply too many different possible combinations of the many elements of these references for there to be any logical possibility that it would have been obvious to select, modify and combine the particular elements claimed in a manner which would have led a person of ordinary skill in the art to Applicant's claimed invention, in the absence of foreknowledge of Applicant's invention. Accordingly, Applicant respectfully submits that the claimed invention would not have been obvious over these references, and that the rejection of Applicant's claims thereover is improper both factually and legally.

Rejection of Claims Based Primarily on Frazier (1-3) and Kato.

Since all of the rejections of Applicant's claims are based on Frazier (1) as the primary reference and Frazier (2) and (3) and Kato, with various additional references relied upon as needed, it is appropriate to focus on these first four "primary" references in showing the untenable nature of the rejections of Applicant's claims set forth in the Office Action. Applicant submits that these references cannot be combined as asserted, and therefore all the rejections are without proper basis in fact and law.

Frazier (1) uses cube mapping for a purpose which differs significantly from the claimed invention. The index cube shadow mapping/depth cube shadow mapping described by Frazier is a system to overcome the limitations caused by depth maps shadows. Namely, when using depth maps shadows it is difficult to generate omnidirectional shadows.

Frazier (1) is using a cubemap for generating depth values. On page 1, lines 13 to 18 Frazier (1) states that the polygons visible to the camera and to the light are compared and if they are not the same polygon, then the pixel should be shadowed. While in depth shadow mapping the basis of comparison is the distance or depth from the camera to the polygon pixel, in index shadow mapping the basis of comparison is an index value that is unique to each polygon. Hence, Frazier (1) uses cubemaps for a fundamentally different purpose than in the presently claimed invention.

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133

Accordingly, there can be no motivation for the one of ordinary skill in the art to combine Frazier (1)-(3) with any other reference cited for rendering soft shadows into a cubemap.

Kato uses, according to column 41, line 27, the shadow generation algorithm disclosed by J.F. Blinn, "Me and My (Fake) Shadows". It is noted that Blinn was cited in Applicant's IDS in this application.

According to Blinn, shadows are generated and rendered by projecting the shadow casting object's polygons onto a ground plane. Nothing different is taught by Kato. As shown in Fig. 65 and Fig. 66 and disclosed in columns 41 and 42 of Kato, Kato generates so-called basic shadow polygons 422 of the 3D-object 420 that are projected onto the projection plane 421 (column 41, line 33). Then, additional triangular polygons 424 are generated. Then, the concentration at the boundary of the basic shadow polygon and the rectangular polygons is set equal to 1, while the concentrations at outer contour of expansion polygons (including the triangular polygons) are set equal to 0. Finally, a concentration gradation is calculated.

Hence, Kato teaches generating soft shadows. However, it is only taught that these soft shadows are projected onto a ground plane. This approach has many drawbacks. Amongst others, it is not useful for projecting shadows onto other objects present in the scene to be rendered.

Applicant respectfully submits that it would not have been obvious for one of ordinary skill in the art to combine the teachings of Kato and Frazier (1)-(3), with or without any additional references.

Frazier teaches use of cubemaps for a fundamentally different purpose. There is no hint or suggestion in the prior art cited to use cubemaps for a different purpose than for generating depth values. There is no hint or suggestion in the prior art cited to combine the teachings of Frazier and Kato.

Obviousness, however, could only be established by combining or modifying the teachings of the prior art to produce the claimed invention, where there is some teaching, suggestion or motivation to do so which can be found in the references cited.

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133

Hence, the combination of Frazier and Kato cannot be properly or legally asserted as a basis for rejection of the presently claimed invention.

Accordingly, Applicant respectfully submits that the Office Action has failed to make any showing of any teaching, suggestion or motivation to combine the teachings of Frazier (1)-(3) and Kato. Accordingly, since all of the rejections rely on the basic combination of these first four "primary" references, it is respectfully submitted that the rejection set forth in the Office Action is not justified.

The mere fact that references can be combined or modified cannot, however, render the resultant combination obvious, at least without a reasonable expectation of success.

Frazier (1), in the section "Limitations, Optimizations and Alternatives", states some severe problems with index cube shadow mapping. Namely, it is stated that the only way to solve the problem of reduction of the shadow resolution with increasing distance from the light is to increase the size of the index cube map. However, this increases video memory consumption and decreases performance.

A person skilled in the art would therefore not have considered combining Frazier and Kato for high-speed rendering of soft shadows.

It is noted that the following is stated at page 4, lines 37-40 of the present specification:

'In the prior art, cubemaps have been used hitherto to create refraction, reflections and environment mapping operations as explained more detailed in [15]. However, they have not been used before to create soft shadows.'

The prior art cited in the Office Action does not alter the correctness of this statement. What is claimed in the present application is not the concept of using cubemaps for graphics rendering itself, but a specific method, computer program and system for using cubemaps for speeding up soft shadow rendering by carrying out the steps of the method and computer program, and by operation of the system claimed in

BLASP0100US (New Docket No. BLASP2225US)Serial No. 10/022,133

claims 1, 11 and 21, respectively. This invention would not have been rendered obvious to a person of ordinary skill in the art by the prior art.

Amongst others, the claimed method, computer program and system of the invention can be used as well for omnidirectional lighting, for computing and high-speed rendering shadows cast by more than one light source and for rendering shadows cast onto the surface of other objects present in the scene to be rendered.

Accordingly, the claimed invention offers various unprecedented advantages and features that would not have been rendered obvious by the prior art cited.

The rejections of all the claims rely on the same basic references with identical or almost identical arguments. Accordingly, the foregoing arguments apply to all of the pending claims.

Accordingly, Applicant respectfully submits that the presently claimed invention would not have been obvious over the prior art, that the claims are allowable thereover, and respectfully requests notice of allowance of the presently pending claims.

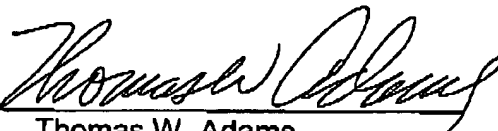
In the event any issues remain with respect to this application, Applicants request the Examiner telephone the undersigned attorney to expedite passage of the application to allowance and issue.

No additional fees are believed due for the filing of this paper. However, if any additional fees are required, Applicants request the Commissioner to charge those fees to deposit account #18-0988, Docket No. BLASP0100US (New Docket No. BLASP2225US).

Respectfully submitted,
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